is also classed by the authors as "approximate integration"; this is a view which does not seem altogether satisfactory. At any rate, the nature of the approximation involved in using an infinite series is certainly different from that associated with the use of Simpson's rules. Incidentally, at least one example (p. 379), in which the integration is effected by a series $\left(\int\{y/(y+c)\}dS\right.$ integrated over a circle), is easily reduced to finite terms in the form,

$$\pi a^2 - 2\pi c\{c-(c^2-a^2)^{\frac{1}{2}}\}.$$

Some of the integrals proposed for evaluation by the aid of series are not very easy to evaluate *directly*; for instance (p. 380), the elliptic integrals,

$$\int_0^x \frac{dx}{\sqrt{(\sin x)}} \text{ and } \int_0^1 \frac{dx}{\sqrt{(1-\frac{1}{2}x^4)}},$$

Both of these can be expressed in various forms, but the series which are more immediately suggested are not very suitable for ordinary calculations; in particular the second of them suggests the binomial expansion of $(1-x^4)^{-\frac{1}{2}}$, but the resulting series is quite hopeless for numerical work. Of course, there are several ways of transforming the integrals before conversion to series; but such transformations might well be suggested in the questions, or the reader may not succeed in guessing what to do first.

In reading the chapters on applications to plane curves one cannot help regretting some of the old-fashioned geometrical types of proof; no doubt the older books contain much that is not only unsound, but incapable of being made sound. But in spite of this, a geometrical treatment is more attractive to the ordinary reader, and in many cases the proofs can be made reasonably accurate by the aid of very little additional analysis.

T. J. I'A. B.

BOOKS ON NATURE-STUDY.

(1) *Der Naturfreund am Strande der Adria und des Mittelmeergebietes.* By Prof. Carl I. Cori. Pp. viii+148+22 plates. (Leipzig: Verlag von Dr. Werner Klinkhardt, 1910.) Price 3.50 marks.

(2) *The Aims and Methods of Nature-Study. A Guide for Teachers.* By Dr. John Rennie. With an introduction by Prof. J. Arthur Thomson. Pp. xvi+352. (London: W. B. Clive, University Tutorial Press, Ltd., 1910.) Price 3*s.* 6*d.*

(1) PROF. CORI'S volume is not intended to give descriptions of the systematic characters and organisation of marine creatures, but rather to be a companion to direct the attention of the nature-student to the more commonly occurring marine organisms and to the chief phenomena associated with them. After a brief account of the past history of the Mediterranean and Adriatic, the author passes to the consideration of the animals of the beach—Arenicola, Sipunculus, Solen, Venus, Echinocardium, Synapta, Carcinus, &c.—the chief features and theoretical points of interest associated with many of which are indicated. While dealing with Annelids, the author directs attention to their relationship to the Crustacea and to the theory of the Annelid ancestry of vertebrates. Modifications of structure correlated with certain habitats, as illustrated, for example, by sessile molluscs, and the habits of animals, *e.g.* the shamming death and autotomy of crabs, are dealt with in an interesting manner. The description of the abundance of life on the beach leads up to remarks on the origin of life in shallow water, "die Geburtsstätte alles Seins." The lagoons and their flora and fauna—Mysidæ, Carcinus, Cardium, Labrax, Anguilla, &c.—and the Zostera meadows, with their extensive and characteristic fauna—Virbius, Spadella, Turbellaria, Cerianthus, Sepia, pipe-fish, sea-horses, &c.—are the subjects of two chapters.

The account of Sepia contains interesting references to the antiquity and former greater abundance of species of Cephalopods in the period when the Ammonites flourished, and to the power of colour change, owing to which "spiegelt sich sozusagen die Seele der Sepia auf ihrer Haut ab." Throughout the volume the author brings before the reader observations on the mode of life, the food and special points in the physiology of the animals under description; for instance, he points out that in Trachinus, the weever-fish, the spreading of the spines and the assumption of the defensive attitude are dependent chiefly on stimulation of the tail. The organisms of the rocks and rock-pools are then considered, attention being given to boring animals, *e.g.* Pholas, Paracentrotus, the former boring by chemical, the latter by mechanical means.

The concluding chapters give accounts of the larger organisms obtained by dredging, and in the plankton (Rhizostoma, some Siphonophores, Ctenophores, and Salps) and on the high sea (fishes, dolphins, &c.). The figures are for the most part excellent, but a few, for instance, those of Aphrodite, Arenicola, and Balanoglossus on Taf. vi., are capable of improvement. A few errors of spelling occur in the names of the animals figured, *e.g. pilleata* (for *pileata*), *forscalea, Litorina,* and *Echineis.* But these are only slight blemishes, and do not seriously detract from the value of this excellent work, which cannot fail to stimulate the interest and imagination of the nature-lovers for whom it is intended.

(2) Dr. Rennie aims at imparting a definite continuity of principle to the teaching of the subject of nature-study and to this end he outlines series of carefully graded courses. He holds rightly that the facts need to be carefully grouped or arranged in sequence, according to principle, in the mind of the teacher (although the principle need not always be enunciated to the pupils), for only in this way can the teaching be effective. Four school courses are suggested, namely, for pupils of seven or eight years, eight or nine years, nine to twelve years, and seniors, all of which are arranged on a seasonal plan and deal in turn with plants, animals, weather studies, calendars, and general considerations. Several chapters are devoted to excellent object-lessons on common living things, *e.g.* frogs and toads, birds and their eggs and feathers, the mole, shells, the snail, caterpillars and moths, earthworms, gnats, buttercups, common fruits and seeds, trees, ferns, &c. Then follow elementary studies of some common rocks, suggestions for a

school garden, studies on insects of economic importance, &c. The lessons are objective and practical, and from the stores of trustworthy information which they contain the teacher can select those topics most applicable to the locality and conditions under which he works. The volume is a plea for care and method, and we can recommend it to those teachers who desire to develop their work in this subject along sound lines. There are 178 illustrations, for the most part good, but several of those of insects might have been more carefully executed.

OUR BOOK SHELF.

An Introduction to Biology for Students in India. By Prof. R. E. Lloyd. Pp. xviii+298+15 plates. (London: Longmans, Green and Co., 1910.) Price 4 rupees (or 5*s*. 4*d*.)

THIS little book does not pretend to be a complete introduction to biology, and the title is perhaps somewhat misleading. It deals exclusively with certain invertebrate types and certain general principles, and appears to have been designed for the use more especially of Indian medical students. The author tells us in his preface that the book was written somewhat hurriedly, because it was urgently needed. The types dealt with have very properly been selected from the Indian fauna, and the work is evidently based very largely upon personal observations, for which the author deserves due credit. Some of the animals described, such as the fresh-water sponge, the scorpion, and the mosquito, are not usually dealt with in elementary text-books.

The work is of a strictly elementary character, but at the same time suffers somewhat from being rather too much up-to-date. Thus the chapter on heredity is practically confined to Mendelism. The author is not always happy in his definitions. He tells us that "the anterior end of an animal is that at which the mouth opens; the posterior end is where the anus is to be found. But difficulties sometimes arise in using these terms; for example, in a gasteropod mollusc, the mouth and anus open in the same direction." Surely it would be more correct to say that primarily the anterior end is carried foremost when the animal moves about, while the posterior end comes hindmost. It is difficult to excuse the spelling of the word "Foramenifera," and the statement that the shells of these animals are "always perforated by minute round apertures" is very misleading. Another misspelling against which we must protest is "chord," for "cord," in the case of the nerve-cord of Annelids. This is a mistake which is frequently made by elementary students, doubtless on the analogy of "notochord," which, of course, is really a Greek word.

It must not, however, be forgotten that this is a pioneer work written under great disadvantages. It shows a considerable amount of originality, both in scope and treatment, and should prove useful to those for whom it is intended. A. D.

Botany for High Schools. By Prof. G. F. Atkinson. Pp. xv+493. (New York: Henry Holt and Co., 1910.)

WHEN it is found that a school text-book of botany of average size contains, in addition to a course of morphology dealing with growth and work of parts of the flowering plant, a series of life-histories drawn from all the plant divisions and accessory chapters on ecology, economic plants and plant breeding, the question naturally arises whether careful exposition is not being sacrificed to variety. There are certainly objections to the inclusion of the life-histories from the lower cryptograms, as they are too sketchy to suffice for practical work; also the range and variation are too complex for the ordinary schoolboy or girl, while many teachers would prefer a good course of physiology or a grounding in the classification of vascular plants as an item in training.

Nearly half the book is devoted to the first part, in which the author presents a well-arranged account of the activities of the plant. The morphology of the vegetative organs is not so well ordered, and there are several unsatisfactory passages, such as the confusion between stem and shoot, unacceptable definitions of "decumbent" and parts of a leaf, and a misuse of cambium in describing the stem of the maize plant. The flowers, methods of pollination, and seed dispersal are treated at some length. The later chapters suffer from excess of generality or a tendency to the introduction of specialised topics, but it should be added that it is the author's intention to present outlines that are to be filled in by the teacher's lectures and practical work.

Proceedings of the Aristotelian Society. New series. Vol. x., 1909–10. Pp. 300. (London: Williams and Norgate, 1910.) Price 10*s*. 6*d*. net.

THE Aristotelian Society exists for the systematic study of philosophy, as to its historic development, and as to its methods and problems. It is an aristocratic body—intellectually speaking—consisting of about one hundred members, among whom are Mr. A. J. Balfour, Mr. Haldane, Prof. Sorley, Dr. Stout, Dr. Bernard Bosanquet, and Dr. Shadworth Hodgson.

In the latest volume of *Proceedings* there are papers on "Sensations and Images," by Prof. Alexander; "The Subject-matter of Psychology," by Mr. G. E. Moore; "Epistemological Difficulties in Psychology," by Dr. William Brown; "Kant's Account of Causation," by Mr. A. D. Lindsay; "Bergson's Theory of Instinct," by Mr. H. Wildon Carr; "Science and Logic," by Mr. E. C. Childs; "Some Philosophical Implications of Mr. Bertrand Russell's Logical Theory of Mathematics," by Mr. S. Waterlow; and two interesting papers on "Are Secondary Qualities Independent of Perception?" by Dr. Percy Nunn and Dr. F. C. S. Schiller respectively. The former takes up a position of vigorous realism, while the latter, with all his accustomed attractiveness of style—even when dealing with very technical matter—hopes to convince Dr. Nunn that philosophical salvation lies in humanism, for which the old terms idealist and realist have almost ceased to have meaning or interest. Dr. Nunn has a curious and rather novel argument in favour of there being possibly something really "there," in some hallucinations. He instances our old friend the "stick bent in a pool." To the eyes, it is bent, to the touch it is straight; in other words, its visual characters are not in the same position as its tactual. May we not therefore see a real thing which, to our other senses, is elsewhere? It is certainly a suggestive analogy, though risky.

Häusliche Blumenpflege. Eine Anleitung zur Pflege der dankbarsten Zimmer- und Balkon-Pflanzen. By Paul F. F. Schulz. Pp. vii+216. (Leipzig: Quelle and Meyer, n.d.) Price 1.80 marks.

ACCORDING to the author plant culture in the home is not sufficiently practised in Germany, and the object of the present work is to arouse more interest in the pursuit. Certainly if the plants for which instructions are given can be grown in the house, many having the time and taking a keen interest in flowers would be inclined to try their skill. The list includes Abutilon, Camellia, the Alpenrose, Bouvardia, Clivia, *Monstera deliciosa*, and *Odontoglossum grande*, in addition to the palms, geraniums, hydrangea, Cacta-